

Therapeutic effects of *Erythrina variegata* on primary dysmenorrhea and endometriosis: An *in silico* analysis

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Primary dysmenorrhea (PD) is painful menstrual cramps, while endometriosis (EM) is a condition where tissue like the uterine lining grows outside the uterus, causing pain and infertility. EM and PD commonly associated in nociceptive pathways and inflammatory responses. In this study, phytochemicals such as erycrystagallin, erystagallin A, eryvarine A, 4-hydroxy-6, 3, 5 triprenyl isoflavonone, eryvarinol A, orientanol B from *E. variegata* have been evaluated for its potential to regulate TNF, COX-1, COX-2, PGF 2 α involved in the inflammatory pathway resulting in hypersecretion of prostaglandins thereby causing excessive constriction of uterine muscle, nerve sensitization which leads to unbearable pain in PD. Similarly, employing network analysis in STRING and Cytoscape along with molecular docking in PyRx, the phytochemicals were investigated for their potential against PSR, ESR1, SF1, CYP19A1, GATA6, and MMP2, which creates an epigenetic abnormality converting stromal cells to endometriotic lesions and triggering inflammation through excessive production of estrogen. Using Cytoscape, the ligands with strong ADMET characteristics were found, and their interactions with the targets were verified. Molecular docking was performed to visualise the target-ligand complexes with the lowest binding affinities between -9 and -9.9. Hydrophobic and electrostatic interactions confirmed the ligands' influence on the targets. *E. variegata* ceases primary dysmenorrhea from developing into endometriosis. Additionally, it minimises estrogen and progesterone imbalances associated with EM & PD.

Keywords: Molecular docking, Cyclooxygenases, Prostaglandins, Estrogen receptors, Aromatase, 4-hydroxy-6,3,5 triprenyl isoflavonone